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ABSTRACT

Children who participate in the School Breakfast Program show significant improvement in academic performance and tardiness rates, and a trend toward improvement in absenteeism. The School Breakfast Program was created by Congress in 1966 to provide a breakfast on school days for low income children who would otherwise have none. Children (N=1,023) in grades 3, 4, 5, and 6 in six elementary schools in Lawrence, Massachusetts, were chosen for a one-year study on the effects of Breakfast Program participation. Rates of change were calculated for test scores on the Comprehensive Test of Basic Skills (CBTS), absence, and tardiness for Program participant and non-participant groups before and after implementation. Participant and non-participant groups were compared with regard to demographic variables from school records, and on their CBTS score, tardiness, and absence rates of change. Results were the following: (1) participants and non-participants did not differ with respect to sex, ethnicity, or number of children per family; (2) participants improved their CBTS score; (3) absenteeism of both participants and non-participants increased, but there was less increase for participants; and (4) tardiness decreased for participants and increased for non-participants. Limitations of the study include the following: (1) access to data was limited to those available from school records; and (2) not knowing which of the study subjects habitually did not eat breakfast prior to the implementation of the Program. Sixteen pages duplicating accompanying explanatory slides are included. (FMW)

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SCHOOL BREAKFAST PROGRAM AND SCHOOL PERFORMANCE

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INTRODUCTION

The School Breakfast Program was created by Congress in 1966 to provide a breakfast, on school days, to low-income children who would otherwise have none. [SLIDE 1 - SBP] Under the Program, School Breakfast is offered at no cost to children with family incomes below 130% of the federal poverty level, at reduced price to those with family incomes between 130 and 185% of poverty, and at full price to all others. 89% of children participating in the Program receive Breakfast at free or reduced price. However, while the National School Lunch Program is available to 98% of schoolchildren in the United States, School Breakfast Program is only offered to 39%. It is estimated that approximately 600,000 children who now skip breakfast would eat breakfast if the Program were universally available nationwide.

It has been demonstrated that twenty-four hour dietary intake is superior for children participating in School Breakfast Program compared to those who eat no breakfast. In addition to these dietary benefits, it is possible that there may be other important effects associated with participation in the Program. Controlled experiments have demonstrated that normal nine-to-eleven year old children make fewer errors on morning tests of cognitive function when they have eaten breakfast, compared to their own performance in the fasted state. This finding, along with the findings of several earlier studies, suggests that the School Breakfast Program may have beneficial effects on the academic performance of children living in poverty. Given the clear discrepancy in academic achievement between poor and nonpoor children, such a benefit would have important policy implications.

In August 1986, Massachusetts enacted legislation mandating the implementation of School Breakfast Program in all public schools in which at least 40% of students qualified for free or reduced-price school meals. This circumstance has enabled us to test the hypotheses [SLIDE 2 - HYPOTHESES] that

low-income children who are participating in the School Breakfast Program for the first time will improve their academic performance, as measured by standardized achievement test scores, compared to their own performance when no Breakfast Program was available, and that this improvement will be greater than any improvement shown by low-income children who do not participate in the Breakfast Program. Similarly, Breakfast Program participants will show greater improvements in rates of absence and tardiness as compared to nonparticipants.

METHODS

[SLIDE 3 - LAWRENCE] Lawrence, Massachusetts was the only one of 5 large school districts in Eastern Massachusetts implementing the School Breakfast Program under the new legislation in which standardized achievement tests were administered annually in all elementary grades and whose superintendant and principals enthusiastically supported the study. 71% of Lawrence public school students are low-income, and 63% are minorities. The Comprehensive Test of Basic Skills (CTBS) is administered annually in the spring, in the morning. The School Breakfast Program was implemented in Lawrence at the start of the second semester of school year 1986-87.

Six of Lawrence's 16 elementary schools were chosen to participate [SLIDE 4 - ELIGIBILITY CRITERIA] All students in grades 3, 4, 5, and 6 in these schools were considered eligible for study if they had qualified for free or reduced-price school meals, if they had been in the Lawrence public schools during the second semester of school years 1985-86 and 1986-87, and if their parents consented.

School Breakfast Program participation was recorded on site by school personnel during the week that the Comprehensive Test of Basic Skills, or CTBS, was administered. The absence and tardiness of each child during this week were determined from regular classroom reports. [SLIDE 5 - DEFINITION OF PARTICIPATION] Students had to be present and not tardy on three or more days

of the study week; those who attended School Breakfast on 60% or more of those days were considered participants, and those who did not attend Breakfast on any day were considered non-participants. All other children were excluded from the analyses.

[SLIDE 6 - OUTCOME MEASURES] We calculated the change in CTBS scores for each student from 1986, before the Program was in place, to 1987, following Program implementation. Similarly, we calculated each student's change in rates of absence and tardiness for the second semester of 1986 to the second semester of 1987. The change in these measures for each student constituted the outcome measures, or dependent variables, in this study design.

[SLIDE 7 - ANALYSIS] Analysis of variance was used to test whether Breakfast Program participants improved more than non-participants in CTBS scores, absence, or tardiness after the implementation of the Program. We compared the participant and non-participant groups with regard to the demographic variables available from the school record, and on their CTBS scores, absence, and tardiness rates prior to Breakfast Program implementation. Multiple regression analysis was used to determine the independent contribution of these variables, including Breakfast Program participation, to the prediction of the outcome measures.

RESULTS

A total of 1092 children were eligible for study and had school records available. Parental refusal rate was 7.6%. [SLIDE 8 - CHARACTERISTICS OF SAMPLE] Of these children, 1023, or 94%, met the study definition of Breakfast Program participant or non-participant. One-third of these children were participants. Breakfast Program participants and non-participants did not differ with respect to sex, ethnicity, or number of children per family. Participants were more likely to be from families with incomes below 130% of poverty. [SLIDE 9 - PARTICIPATION BY GRADE] Rate of participation declined with increasing grade in school.

[SLIDE 10 - BATTERY ANOVA] Breakfast Program participants had significantly lower CTBS Total Battery scaled scores in 1986, prior to the implementation of the Program. However, in 1987, with the Program in place, the size of the difference was reduced. Participating children improved their scores by a mean 48.4 points, compared to a 40.9-point improvement for non-participants, a highly significant difference. I would like to bring to your attention that these results differ from the preliminary results presented in our abstract, which contained a file-merge error. [SLIDE 11 - BATTERY REGRESSION] Multiple regression analysis showed that Breakfast Program participation contributed significantly to the prediction of increase in Battery Total scaled score, and followed only grade in school and 1986 Battery Total scaled score in the weight of its contribution.

Analysis of CTBS subscores for reading, language, and mathematics showed a similar pattern. [SLIDE 12 - SUBSCORE ANOVA] Breakfast Program participants had significantly greater improvements in language and marginally significantly greater improvements in reading and math scores, as compared to non-participants. However, multiple regression models fail to demonstrate an independent contribution of Breakfast Program participation to determination of increase in score.

[SLIDE 13 - ABSENCE ANOVA AND REGRESSION] The absenteeism of both participants and non-participants increased from 1986 to 1987, with a trend towards a lesser increase in participants. Multiple regression showed a contribution of Breakfast Program participation to reduced absenteeism at the p .09 level. This effect was much more pronounced for tardiness. [SLIDE 14 - TARDINESS ANOVA AND REGRESSION]. In 1986, participants and non-participants did not differ in tardiness. In 1987, tardiness decreased for participants and increased for non-participants, a highly significant difference. Breakfast Program participation was a highly significant predictor of change in tardiness in the regression model.

DISCUSSION

In this study of the effects of a newly-implemented School Breakfast Program we have found a small but statistically significant positive association between participation in the Breakfast Program and improvement in standardized achievement test scores and in tardiness. That there may be such an effect has been suggested by experiments in the classroom and in the clinical research unit, but to date no published studies have examined the academic effects of the School Breakfast Program as currently administered.

There are a number of limitations of this study. [SLIDE 15 - LIMITATIONS] This was not a controlled experiment, thus limiting our ability to make causal inferences. The only variables we were able to examine to characterize the two self-selected cohorts of Breakfast Program participants and non-participants were those available in the school record. Several variables which might be potentially confounding were therefore not examined. And, though it is precisely the goal of the School Breakfast Program to provide a morning meal to low-income children who would otherwise have none, we did not have data available to us to indicate which of our study subjects had habitually missed breakfast prior to the institution of the Program.

[SLIDE 16 - CONCLUSIONS] These data do suggest that participation in the School Breakfast Program by low-income children has real benefits for their academic function, tardiness rates, and perhaps absenteeism. While the observed effects are small, it is also possible that the small excess improvement in standardized test scores is a marker for improvements in other aspects of academic function not measured in this study. The observed improvement in academic performance could represent an immediate beneficial effect of breakfast on children who had previously had none, as suggested by the studies cited earlier. It is also possible that the benefit is due to the long term effect of the demonstrated improvement in dietary status experienced

by children who eat School Breakfast compared to those who eat no breakfast. In this case, there may be even greater measurable effects over periods of time longer than the three months the Program was in place in Lawrence prior to the 1987 achievement testing. If the School Breakfast Program continues to be implemented in schools serving low-income children who currently do not offer it, it may be possible for other investigators to utilize similar or differing study designs to address these questions and confirm our findings of beneficial effects of participation in the School Breakfast Program on school performance.

SCHOOL BREAKFAST PROGRAM

TARGETED TO LOW-INCOME CHILDREN

INTENDED TO OFFER BREAKFAST TO CHILDREN WHO WOULD OTHERWISE HAVE NONE

OFFERED FREE TO CHILDREN LIVING BELOW 130% OF POVERTY, AT REDUCED PRICE TO THOSE BETWEEN 130 - 185% OF POVERTY

CURRENTLY AVAILABLE TO ONLY 39% OF PUBLIC SCHOOL CHILDREN

HYPOTHESES

- LOW-INCOME CHILDREN WHO ARE PARTICIPATING IN THE SCHOOL BREAKFAST PROGRAM FOR THE FIRST TIME WILL IMPROVE THEIR ACADEMIC PERFORMANCE, AS MEASURED BY STANDARDIZED ACHIEVEMENT TEST SCORES, COMPARED TO THEIR OWN PERFORMANCE WHEN NO BREAKFAST PROGRAM WAS AVAILABLE, AND THIS IMPROVEMENT WILL BE GREATER THAN ANY IMPROVEMENT SHOWN BY LOW-INCOME CHILDREN WHO DO NOT PARTICIPATE.

- BREAKFAST PROGRAM PARTICIPANTS WILL SHOW GREATER IMPROVEMENTS IN RATES OF ABSENCE AND TARDINESS AS COMPARED TO NON-PARTICIPANTS.

LAWRENCE, MASSACHUSETTS

POPULATION 63,175

OF PUBLIC ELEMENTARY SCHOOL CHILDREN:

- 71% ARE LOW INCOME
- 63% ARE MINORITIES
  (58% HISPANIC, 37% WHITE, 3% BLACK, 2% ASIAN)

CALIFORNIA TEST OF BASIC SKILLS (CTBS)
IS ADMINISTERED ANNUALLY TO ALL STUDENTS,
IN THE MORNING

SCHOOL BREAKFAST PROGRAM WAS IMPLEMENTED AT
THE START OF THE SECOND SEMESTER OF 1986-87

ELIGIBILITY CRITERIA

- IN GRADE 3,4,5, OR 6 OF A STUDY SCHOOL
- QUALIFIED FOR FREE OR REDUCED-PRICE SCHOOL MEALS
- ATTENDED LAWRENCE PUBLIC SCHOOLS IN BOTH 1985-86 AND 1986-87
- PARENTAL CONSENT GIVEN

DEFINITION OF PARTICIPATION

PARTICIPANTS:

- PRESENT AND NOT TARDY ON 3 OR MORE DAYS OF THE STUDY WEEK
- PARTICIPATE IN SCHOOL BREAKFAST $\geq$ 60% OF THESE DAYS

NON-PARTICIPANTS:

- PRESENT AND NOT TARDY ON 3 OR MORE DAYS OF THE STUDY WEEK
- DO NOT PARTICIPATE IN SCHOOL BREAKFAST ON ANY OF THESE DAYS

ALL OTHER CHILDREN EXCLUDED FROM ANALYSES (N = 69, 6.3%)

OUTCOME MEASURES

- CHANGE IN CTBS SCORES CALCULATED FOR EACH STUDENT FROM 1986 (PRE-SBP) TO 1987 (POST-SBP)
- CHANGE IN SECOND SEMESTER ABSENCE AND TARDINESS RATES CALCULATED FOR EACH STUDENT FROM 1986 TO 1987

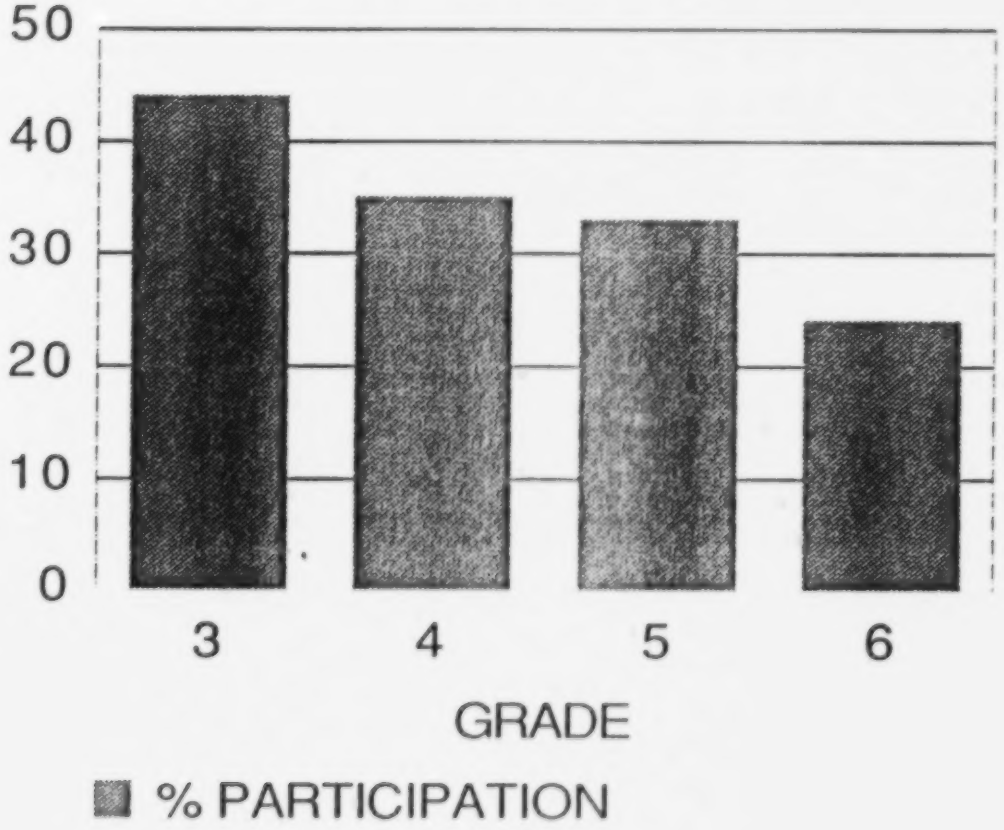
ANALYSIS

- ANOVA USED TO TEST WHETHER SBP PARTICIPANTS IMPROVED MORE THAN NON-PARTICIPANTS IN CTBS SCORES, ABSENCE, OR TARDINESS AFTER IMPLEMENTATION OF SBP.
- PARTICIPANTS AND NON-PARTICIPANTS COMPARED ON DEMOGRAPHIC VARIABLES AND 1986 (PRE-SBP) CTBS SCORES, ABSENCE, AND TARDINESS
- MULTIPLE REGRESSION USED TO DETERMINE THE INDEPENDENT CONTRIBUTION OF ALL VARIABLES, INCLUDING SBP PARTICIPATION, TO OUTCOME MEASURES

CHARACTERISTICS OF STUDY SAMPLE

	PARTICIPANTS N = 335	NON-PARTICIPANTS N = 688	P
SEX			
MALE	51%	50%	NS
FEMALE	49%	50%	
ETHNICITY			
HISPANIC	67%	62%	NS
WHITE	27%	29%	
OTHER	6%	9%	
NUMBER OF CHILDREN IN FAMILY	3.4	3.4	NS
FAMILY INCOME (% POVERTY)			
<135%	98%	92%	< .001
135-185%	2%	8%	

SBP PARTICIPATION BY GRADE



CTBS BATTERY TOTAL SCALED SCORE

ANALYSIS OF VARIANCE

	SBP PARTICIPANTS N = 199	SBP NON-PARTICIPANTS N = 437	P
MEAN 1986 SCORE	362	378	.003
MEAN 1987 SCORE	411	420	.089
MEAN CHANGE IN SCORE	48	41	.004

CTBS BATTERY TOTAL SCALED SCORE

MULTIPLE REGRESSION ANALYSIS
DEPENDENT VARIABLE:
CHANGE IN SCORE FROM 1986 TO 1987

INDEPENDENT VARIABLE	B	P
GRADE IN SCHOOL	-6.09	.001
1986 CTBS BATTERY SCORE	-.062	.017
SBP PARTICIPATION	5.706	.023
SEX OF CHILD	4.986	.043
NUMBER OF CHILDREN	-1.574	.052
% ABSENCE IN 1986	-0.438	.071
ETHNICITY	3.077	.222

CTBS SUBTEST SCALED SCORES
CHANGES FROM 1986 TO 1987
ANALYSIS OF VARIANCE

	SBP PARTICIPANTS	SBP NON-PARTICIPANTS	P
CHANGE IN LANGUAGE	38	32	.026
CHANGE IN MATHEMATICS	39	34	.093
CHANGE IN READING	44	39	.105

CHANGE IN ABSENCE RATES, 1986 TO 1987

PERCENT OF SECOND SEMESTER DAYS ABSENT

ANALYSIS OF VARIANCE

	SBP PARTICIPANTS N = 311	SBP NON-PARTICIPANTS N = 642	P
1986	5.7	6.1	.28
1987	6.2	7.1	.03
CHANGE 1986-1987	.5	1.0	.27

MULTIPLE REGRESSION: FOR SBP PARTICIPANTION,

B = .611 P = .093

CHANGE IN TARDINESS RATES, 1986 TO 1987

PERCENT OF SECOND SEMESTER DAYS TARDY

ANALYSIS OF VARIANCE

	SBP PARTICIPANTS N = 329	SBP NON-PARTICIPANTS N = 659	P
1986	1.5	1.5	NS
1987	.9	1.8	< .001
CHANGE 1986-1987	-.6	.3	.001

MULTIPLE REGRESSION: FOR SBP PARTICIPATION,

B = .829 P = .0001

LIMITATIONS OF STUDY

- RETROSPECTIVE COHORT STUDY, NOT A CONTROLLED EXPERIMENT
- LIMITED NUMBER OF DESCRIPTIVE VARIABLES AVAILABLE
- DATA ON WHICH CHILDREN SKIPPED BREAKFAST IN YEAR PRIOR TO SBP ARE NOT AVAILABLE

CONCLUSIONS

SCHOOL BREAKFAST PROGRAM PARTICIPATION BY LOW-INCOME CHILDREN IS ASSOCIATED WITH:

- SIGNIFICANT IMPROVEMENT IN ACADEMIC PERFORMANCE
- SIGNIFICANT IMPROVEMENT IN TARDINESS RATES
- A TREND TOWARD IMPROVEMENT IN ABSENTEEISM